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A Review on Drip Irrigation System

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Abstract-
Irrigation can be defined as the process of applying artificial water to soil or land in order to promote the growth of agricultural crops such as corn and wheat. Water irrigation has a number of advantages,including an increase in crop yield, protection against famine, revenue generation, and the avoidance of mixed cropping. It also has advantages in navigation, hydroelectric power generation, and the creation of employment opportunities. It should be noted that irrigation has both advantages and disadvantages, just like everything else. Irrigation has a number of disadvantages, including the waste of irrigation water, formation of marshy lands, damp weather, and the loss of valuable agricultural land. Drip irrigation is one of the surface and subsurface irrigation methods that we will discuss in this paper. We will also discuss the various effects and advancements in this technique that have occurred as a result of the research conducted. Last but not least, the significance and necessity of this system will be discussed Drip Irrigation system. It has huge ability for water and nutrient conservation. The main aim is to reduce water scarcity near root zone and reduce evaporation. The assessment of yield and water productivity of clementine trees, cotton, pomegranate cultivars etc. is discussed. Effect of Drip irrigation on economic factors, productivity, fertilization techniques and irrigation scheduling is studied. The drip irrigation on several cash crops like cotton, jute, groundnut, etc. in different parts of countries like China, India, Japan, North Xinjiang, European countries etc. are discussed. The Assessment with season, geography, environment, availability of resources is systematically highlighted Improvement and future scope for sustainable development is discussed. Also the computational analysis of Drip irrigation methodology and technology is done in order to improve the productivity and minimize the efforts and use of resources. The modeling and monitoring of 3D flow of water under drip irrigation is also studied. The overall effort in the current review analysis is to develop an optimum methodology and technology to enhance the use of Drip irrigation in large scale cultivation and Production.

Key words:- Drip, Irrigation, Artificial Irrigation, Efficiency, Framers

Introduction:
The land and water represent the country's fundamental requirements for agriculture and economic growth. The International Water Management Institute (IWMI) estimates that by the end of 2025, 1/3 of the world's inhabitants will face the absolute water shortage. A process of irrigation was considered necessary for rapid development of agriculture that consumes much than eighty percentages of an exploitable water supplies of world.

The overall productivity of the agricultural sector and the expected rate of growth in GDP rely largely on the sensible use of the available water supplies. In India, however, micro-irrigation techniques are actively supported by the national government, state governments, and several local and foreign non-governmental organisations (NGOs) by offering various forms of social, administrative, and technological support systems. Such innovations are marketed mainly a way to conserve water in the irrigated agriculture, it is a tool to raise income & alleviate hunger, to improve the food & nutrition welfare of poor households for one or several of the following purposes [1]. This Micro Irrigation Scheme (MI), which aims to increase the region using effective irrigation techniques viz. Irrigation by drip. Drip irrigation is the effective way for delivering irrigation water undeviating to soil in the plant's root region,

The Drip irrigation is a form of micro-irrigation device that can conserve energy & nutrients by enabling energy to drip moderately to plant root, either from above the surface of the soil or buried underneath the surface [4-5]. The goal is to specifically inject water into the roots zone to reduce the evaporation. Drip irrigation systems use a network of pumps, tanks, tubes, and emitters to convey water. A drip irrigation system may be more powerful than other forms of irrigation systems, such as ground irrigation or sprinkler irrigation, based on how well it is built, installed, managed, and controlled

Many large drip irrigation structures use some form of filters to prevent small waterborne particles from clogging the narrow emitter flow path. New technologies that mitigate clogging are now being offered. Any residential systems are built without extra filters as at the water treatment facility, potable water is still purified. Practically all makers of drip irrigation systems advocate using filters and do usually not respect warranties until this is achieved [8-9]. Owing to small particle settling and unintended injection of particles into the intermediate layers, last filters line just before a final transmission pipe will highly advised in addition to every another filtration

reducing typical losses like shallow percolation, drainage, & soil erosion. Drip irrigation is more effective and inexpensive, unlike surface irrigation, if it is applied in water poor regions with undulated topography, deep & sandy soils & heavy-value crops with wide spacing [2]. This also allows fertilizers, nutrients, and other water-soluble substances to be used along with irrigation water, leading to higher yields & improved production results [3]. Thus, the method of drip irrigation is seen as a solution to several of the problem of dry land cultivation and increasing the output of irrigated agriculture. The path of several systems are being applied to facilitate the drip irrigation. Therefore, it is important for the drip irrigation farmers to know the advantages and restrictions of the method in the process of achieving higher output of the drip irrigation

device. Drip and surface drip irrigation is used nearly entirely as the urban wastewater is treated. Usually, the rules do not require water to be pumped into the air that has not been thoroughly handled to the requirements of potable water.

Standard surface formulations of timed-release fertilizer are often inefficient due to the current ways the water is treated in the drip system, because the drip mechanisms sometimes blend liquid fertilizer with the irrigation water [10]. It’s called chemigation & fertigation (application of toxins & other substances to regularly flush out the body, like sulfuric acid or chlorine) using chemical syringe like diaphragm motors, aspirators or piston engines. The chemicals can continuously have applied while the device irrigates at the intervals. From recent university field studies, the use of the fertilizer savings of up to ninety five percentage was recorded using drip fertilization and slow water distribution relative to accelerated discharge and micro-spray head irrigation. Properly planned, built and controlled, drip irrigation can help to accomplish water efficiency by minimizing evaporation and deep runoff relative to other irrigation types such as overhead or flood sprinklers, as water can have delivered more directly to the plants roots [11-13]. Additionally, drip can remove many diseases transmitted by contact with the

vegetation through spray. Lastly, there could be no real water savings in regions where water sources are extremely reduced, but instead merely an increase in demand by consuming the same volume of water as before. The alternative approach is to spread irrigation water as lightly as possible in very arid areas, or on sandy soils.

Capacity of Drip System:

The factors that plays crucial role in maintaining the capacity of the Drip System is listed herein:-

The drippers involved in the drip irrigation are closely installed to each of the root portions of the agricultural crops. The lateral involved by the drip irrigation technique is placed along each row(s) of the agricultural crops [14]. And the number of lateral placed at the row(s) of the crops are taken almost equal to the overall growth of the agricultural crops.
• In the case of the close growing agricultural crops, the entire agricultural area is required to be wetted and moisturized properly
• The drippers included in the drip irrigation technique is used to turn as a line source of the water rather than a point source, so that the dripped water directly falls in the root portions of the agricultural crops.
• However, in case of the closely spaced agricultural field crops, large number of the drippers are needed to carry out the drip irrigation technique.
• The process of operation and installation of such large scale drippers unit(s) are prone to many problems while used for a large period of time.
• Therefore, there is implementation of the emitting pipes inbuilt with dripper units placed at an optimal distance from each other along the lateral pipe(s) to carry out a preferred drip irrigation.

The distance between two drippers, laterals and number of drippers per lateral in closely growing crops is determined by taking into account the displacement of the water front with period in vertically and horizontally direction in the soil in near developing agricultural field crops

Objective:

In view of all these, the present research was planned to research the degree of advantages obtained from drip irrigation in horticultural crops and to recognize the challenges faced by farmers in the implementation of drip irrigation in horticultural crops.
• Drip irrigation aims to improve water usage in cultivation by distributing water & or minerals directly to the crop's roots via emitters.
• Ensure adequate moisture for plant development.
• Start providing crop protection towards drought in a limited time duration.
• Both soil and weather get cooled to create an optimal climate for the growth of the crops.
• Wash away the dilute toxic salts and unwanted soil chemicals from the roots region of the agricultural crops. • Drip irrigation is the main effective method for providing water and nutrients for the growth of the agricultural crops.
• It provides organic matter straight to the roots system of the crop, in the correct quantities, at the proper time so that every plant receives just what it required to develop optimally when it requires.
• Usually operated at reduced pressure than most other pressurized irrigation methods, thus reducing power costs.
• Foliage stays healthy, thereby reducing disease risk.
• Fertigation can be effectively implemented with minimum fertilizer loss.
• Supply differences may be controlled by regulating the valves and drippers unit(s).
• The labor costs are lower than other forms of irrigation.
• The water distribution is highly uniform, controlled by the output of each nozzle.
• Growth of the weeds are lessened and brought into control.
• Erosion of the soil is minimized.
• Soil type plays some less important roles in the frequency of irrigation

METHODOLOGY

The present research was performed in the Tamilnadu, district of Dindigul. The study used the expost -element analysis method. A group consisting of 30 gout irrigation farmers were randomly chosen from the three R.P villages intentionally chosen. Pudhur, Manjanaickenpatty and chatrapatti in the taluks of Oddanchatram, where the highest area of the horticultural plants is irrigated by drip system. The

survey was designed to hold the research goals in the context, introduced in non-sampling field and then used to gather the data from the respondents needed. The questionnaire used in this study was adapted from the previous English language literature, that was validated and subsequent changes were made before the final questionnaires that were required to be administered

LITERATURE REVIEW

Land and water represent the country's fundamental needs for agriculture and economic growth. By 2025, 1/3 of the world's population will face total water shortage. Agriculture consumes over eighty percentage of the exploitable water supplies of the world. The global productivity of the agricultural sector & the expected rate of development in GDP entirely rely primarily on the sagacious utilize of the obtainable water supplies. Therefore, this Micro Irrigation scheme which aim to increase the region under the efficient irrigation techniques via irrigation by Drip technique.

Drip irrigation is the effective way of delivering irrigation of water directly to soil in the plant's root areas, reducing typical mislaying such as soil erosion, deep percolation and runoff. This also permits fertilizers, nutrients, & other water-soluble substances to be used along with irrigation water, leading to higher yields and improved production results.

Drip irrigation systems is seen the solution to several challenges of dry land cultivation and increasing the output of irrigated cultivation. In view of all these, the present research was planned to research the degree of advantages obtained from drip irrigation in horticultural crops and to recognize the constraints faced by farmers in the adoption of the drip irrigation in horticultural crops

HISTORY

Primitive drip irrigation has been used since ancient times. Fan Sheng-Chih Shu, written in China during the first century BCE, describes the use of buried, unglazed clay pots filled with water as a means of irrigation. Modern drip irrigation began its development in Germanyin 1860 when researchers began experimenting with subsurface irrigation using clay pipe to create combination irrigation and drainage systems. Research was later expanded in the 1920s to include the application of perforated pipe systems. The usage of plastic to hold and distribute water in drip irrigation was later developed in Australia by Hannis Thill

Usage of a plastic emitter in drip irrigation was developed in Israel by Simcha Blass and his son Yeshayahu 151 Instead of releasing water through tiny holes easily blocked by tiny particles, water was released through larger and longer passageways by using velocity to slow water inside a plastic emitter. The first experimental system of this type was established in 1959 by Blass who partnered later (1964) withKibbutz Hatzerim to create an irrigation company called Netafim. Together they developed and patented the first practical surface drip irrigation emitter

In the United States, the first drip tape, called Dew Hos, was developed by Richard Chapin of Chapin Watermatics in the early 1960s.

Modern drip irrigation has arguably become the world's most valued innovation. in agriculture since the invention of the impact sprinkler in the 1930s, which offered the first practical alternative to surface irrigation. Drip irrigation may also use devices called micro- spray heads, which spray water in a small area, instead of dripping emitters. These are generally used on tree and vine crops with wider root zones.

Subsurface drip irrigation (SDI) uses permanently or temporarily buried dripperline or drip tape located at or below the plant roots. It is becoming popular for row crop irrigation, especially in areas where water supplies are limited or recycled water is used for irrigation. Careful study of all the relevant factors like land topography, soil, water, crop and agro-climatic conditions are needed to determine the most suitable drip irrigation system and components to be used in a specific installation.

DISCUSSION AND RESULTS

Analyzed gathered knowledge as well as findings summarized in the Table 1 below.

S NO.	Benefits of Drip irrigation farmer	No. expressing the advantage	
		Number (n=30)	Percent (%)
1	Saving of water	27	92.38
2	Saving of labour cost for irrigation	24	77.36
3	Uniform application	25	93.12
4	Improved quatily of produce	20	62.63
5	Easy method of irrigation	27	83.65
6	Decreased weed growth	19	74.21
7	Increased crop yeid	26	75.62

CONCLUSIONS: Farmers with less income or small farmers who are marginalized have less tendency to obtain drip irrigation systems in any form. The major reason for it is the high initial costs and short lifespan of pipes in this system. Also, since most of these small farmers do not have large enough land holdings, therefore investing in drip irrigation techniques becomes not viable for them.

The advantages faced by the farmers are water-saving, standardized implementation & simple irrigation system, & the restrictions are the issues of the non-availability of quality content & the shortage of drip agent follow-u facilities. From the report, it is clear that the drip irrigation companies, funding organizations and others have sufficient model spare parts and other necessary steps to ensure a suitable situation for proper implementation of the drip irrigation systems. The findings showed that the majority of gout irrigation farmers had reported benefits such as water savings, labor cost savings for irrigation, improved yields, energy savings, labor savings, improved product quality, reduced weed production, expanded product self-life and standardized energy distribution. The challenges faced by the farmers had problems with the non-availability of good material, no drip agency follow-up facilities, high initial expenditure costs, lacks of funds to finance full holdings under drip irrigation, delay in loan penalties, and leakage in the new drip scheme.

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